

(19)



(11)

EP 3 575 178 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.12.2019 Bulletin 2019/49

(51) Int Cl.:
B61F 19/04 (2006.01)

(21) Application number: **18305679.5**

(22) Date of filing: **01.06.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(54) OBSTACLE DEFLECTOR FOR A RAIL VEHICLE

(57) This obstacle deflector (12), for a rail vehicle (10) having a carbodyshell (14) with a front end, comprises a support member (18, 26) arranged to be fixed at a proximate end (18a) to the a front end of the carbodyshell (14); a moving element (16, 24) supported by said support member (18, 26) so as to be slideably movable with respect to the support member (18, 26); and a shield element (20) fixed to a front end (16a, 24a) the moving element (16, 24). The moving element (16, 24) is arranged

to move between an extended position, wherein the shield element (20) is spaced from a distal end (18b, 26b) of the support member (18, 26) and is arranged to push away an obstacle placed in front of the rail vehicle (10), and a retracted position, wherein the shield element (20) is in contact with the distal end (18b, 26b) of the support member (18) and is arranged not to push away said obstacle.

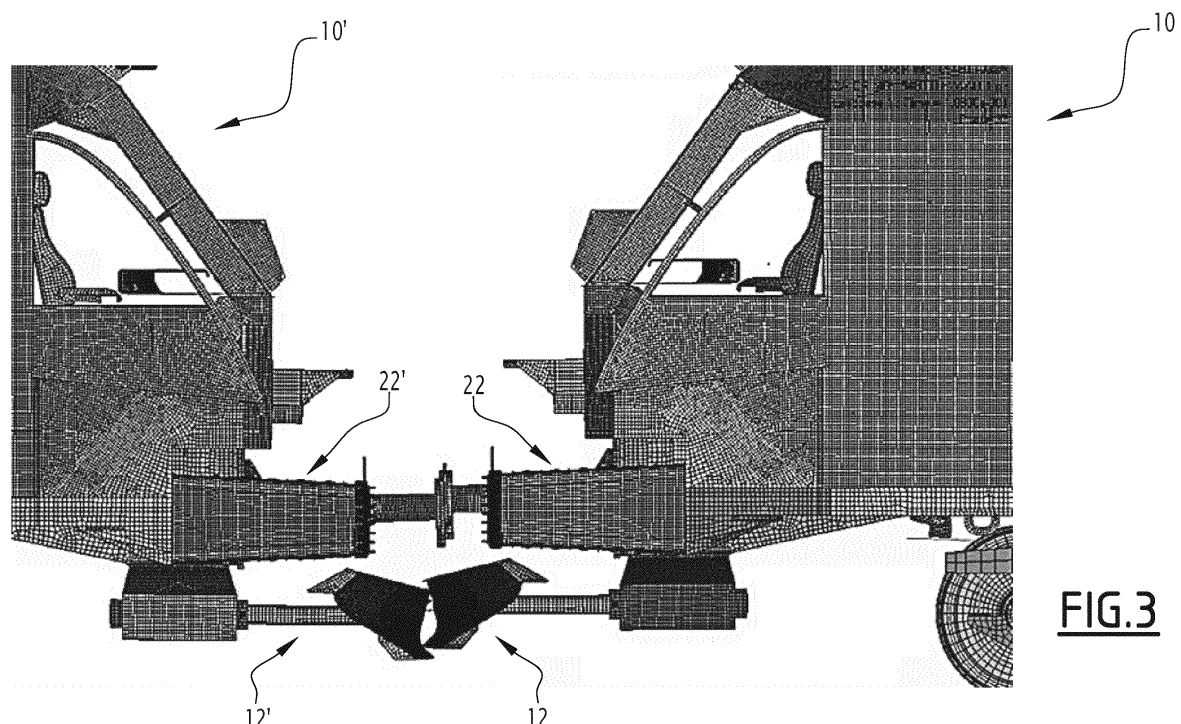


FIG.3

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Description

[0001] The present invention relates to an obstacle deflector for a rail vehicle.

[0002] An obstacle deflector for a rail vehicle, also known as snowplough or pilot, is a device which is usually placed at the front end of a carbodyshell of a rail vehicle, such as a train, and is arranged to deflect possible obstacles present on the railway track that might otherwise derail the train when the latter is travelling along the track. Obstacles should be deflected as early as possible because otherwise they might damage the train, thus resulting in unnecessary maintenance costs.

[0003] Figure 1 shows a schematic lateral view of a train 1 having an obstacle deflector 2 which is fixed to the front end of its carbodyshell 4 and is capable of performing the primary task of removing obstacles from the railway track, thus protecting the train 1 from derailment. However, this obstacle deflector 2 is not capable of protecting the carbodyshell 4 from damages, because it happens quite frequently that obstacles firstly hit the cover panel of the carbodyshell 4 and only later they are pushed away by the obstacle deflector 2.

[0004] In fact, an obstacle deflector designed according to the EN 15227 standard has usually to be installed in longitudinal direction behind or in a back position below the energy absorber elements, also known as energy dissipation devices, which are fixed, in known manner, to the front end of the carbodyshell 4 and are arranged to absorb the impact energy in case of impacts with obstacles which may be present on the path of the train 1.

[0005] In order to guarantee the proper functioning of these energy absorber elements, the obstacle deflector 2 is usually placed behind them because otherwise, due to the fact that it is a fixed element, in case of crash events it would restrain the energy absorber elements, not allowing their proper functioning.

[0006] As a result, the front end of the carbodyshell of the train 1, with its grp (glass reinforced plastic) structure and equipment, remains unprotected.

[0007] It is therefore an object of the present invention to provide an obstacle deflector for a rail vehicle which is capable of both removing obstacles from the railway track and protecting the carbodyshell of the train from impacts with these obstacles, thus overcoming the limitations of the prior art solutions.

[0008] This and other objects are fully achieved by virtue of an obstacle deflector for a rail vehicle having the characteristics defined in independent claim 1.

[0009] Preferred embodiments of the invention are specified in the dependent claims, whose subject-matter is to be understood as forming an integral part of the present description.

[0010] Further characteristics and advantages of the present invention will become apparent from the following description, provided merely by way of a non-limiting example, with reference to the enclosed drawings, in which:

- Figure 1 shows a schematic lateral view of a train having an obstacle deflector according to the prior art;
- Figure 2 shows a schematic lateral view of a train having an obstacle deflector according to the present invention;
- Figure 3 shows a lateral view of the train of figure 2 with its obstacle deflector;
- Figure 4 shows a perspective view of an obstacle deflector according to the present invention;
- Figure 5 shows a perspective view of the obstacle deflector of figure 4 in an extended position, when seen in a direction different from the one of figure 4;
- Figure 6 shows a perspective view of the obstacle deflector of figure 5 in a retracted position, when seen in the same direction as in figure 4;
- Figure 7 shows a perspective view of an alternative embodiment of the obstacle deflector according to the present invention;
- Figure 8 shows a perspective view of the obstacle deflector of figure 7 in an extended position, when seen in a direction different from the one of figure 7; and
- Figure 9 shows a perspective view of the obstacle deflector of figure 8 in a retracted position, when seen in the same direction as in figure 7.

[0011] Briefly, the obstacle deflector of the present invention is capable of both removing obstacles present on a railway track and protecting the carbodyshell of a train without requiring modifications to the energy absorber elements usually present on the front end of a carbodyshell of a train.

[0012] The obstacle deflector of the present invention, thanks to the fact that of being movable, can be placed in front of the energy absorbers because during a crash scenario it is arranged to slide back without affecting the operation of the energy absorbers.

[0013] The obstacle deflector according to the present invention has the same functionalities as any other fixed mounted deflector of the prior art according to the EN 15227 standard.

[0014] Figure 2 shows a schematic lateral view of a train 10 having an obstacle deflector 12 fixed to the front end of its carbodyshell 14 in a forward position with respect to the prior art, so that obstacles first collide with the obstacle deflector 12 and then are moved away from the railway track.

[0015] The obstacle deflector 12 is mounted in an extended position so as to project forward beyond energy absorber elements of the train 10: when an obstacle approaches the train 10, it firstly impacts the obstacle deflector 12.

[0016] If the level of the impact force between the obstacle and the obstacle deflector 12 itself is below a predetermined threshold, the obstacle deflector 12 pushes the obstacle away from the railway track, otherwise, it moves to a retracted position wherein it does no more

project beyond the energy absorber elements.

[0017] Figure 3 shows a lateral view of the train 10 with its obstacle deflector 12 placed under energy absorber elements 22, and another opposed train 10' with its obstacle deflector 12' placed under its energy absorber elements 22'.

[0018] In case of crash between the two trains 10 and 10', the respective obstacle deflectors 12 and 12' move from the extended position shown in figure 3, wherein they project beyond the corresponding energy absorber elements 22 and 22', to the retracted position, wherein they do not project beyond the corresponding energy absorber elements 22 and 22', as disclosed herein below in detail.

[0019] In order to withstand accidents with obstacles having an impact force level below a threshold, for example equal to 300kN, as indicated in the scenarios disclosed in the EN 15227 standard, the obstacle deflector 12 is positioned, as above indicated, so as to project beyond the energy absorber elements 22, while having at the same time the stability and stiffness required by EN 15227 standard. The obstacle deflector 12 is however able to move backwards to the retracted position if the impact force level exceeds said threshold.

[0020] With reference to figure 4 the obstacle deflector 12 of the present invention includes a support member 18 having a buckling-free system, for example a sledge 16 (e.g. a Coradia LINT, a light regional train of Alstom TD), and a shield element 20 fixed to a front end 16a of the sledge 16. The sledge 16 is carried by the support member 18 so as to be slideably movable with respect to the support member 18 between a first position represented on figures 4 and 5, the above-cited extended position, and a second position represented on figure 6, the above-cited retracted position. The sledge 16 and the shield 20 together form a sub-assembly 17, movable with respect to support member 18.

[0021] The support member 18 is arranged to be fixed at a proximal end 18a to a front end of the carbodyshell 14 of the train 10.

[0022] The sledge 16 is arranged to slide between the extended position, wherein the shield element 20 is spaced from a distal end 18b of the support member 18 and is arranged to push away obstacles placed in front of the train 10, and the retracted position, wherein the shield element 20 is in contact with such distal end 18b of the support member 18.

[0023] In case of a crash force exceeding the threshold, the sub-assembly 17, and thus the sledge 16, can slide into the lower area of the grp part of the carbodyshell 14, thus moving from the extended position to the retracted position.

[0024] In order to allow this sliding movement of the sub-assembly 17, the sledge 16 and the support member 18 are connected by tearing elements 21, such as breakable screws, one of which is represented in an exploded position on figure 5. This allows sledge 16 to slide with respect to support member 18, from the extended posi-

tion of figures 4 and 5, to the retracted position of figure 6, when the tearing elements 21 are broken due to an impact force of an obstacle on the shield element 20 exceeding the threshold of the impact force.

[0025] Two energy absorber elements 22, placed side by side above the obstacle deflector 12, are arranged to be fixed at a proximal end 22a to the carbodyshell 14 of the train 10 without being in contact with the obstacle deflector 12, and the shield element 20 is mounted so that, in the extended position, it project forwards beyond distal ends 22b of the energy absorber elements 22. In the retracted position, the shield element 20 does not project anymore beyond the distal end 22b of the energy absorber elements 22, so that it does not interfere with an obstacle if this obstacle interacts with the energy absorber elements 22.

[0026] Energy absorber elements 22 are distributed on either sides of a central longitudinal axis X14 of carbodyshell 14. For the sake of simplicity energy absorber elements 22 are not represented on figures 5 and 6.

[0027] Figure 5 is a further perspective view of the obstacle deflector 12 of figure 4 with its sub-assembly 17 in the extended position; while figure 6 is a perspective view of the obstacle deflector 12 of figure 4 with its sub-assembly 17 in the retracted position.

[0028] Figure 7 is a perspective view of an alternative embodiment of the obstacle deflector 12 of the present invention which includes two lateral rods 24 and a supporting member or box 26 arranged to host said rods 24. Two energy absorber elements 22 are distributed on either sides of a central longitudinal axis X14 or carbodyshell 14. For the sake of simplicity energy absorber elements 22 are not represented on figures 8 and 9.

[0029] The shield element 20 and the rods 24 together form a sub-assembly 17, movable with respect to support member 18. Preferably, tearing elements 21 are screws or bolts.

[0030] The shield element 20 is fixed to a front end 24a of the rods 24.

[0031] The rods 24 are arranged to slide between the extended position, wherein the shield element 20 is spaced from a distal end 26b of the supporting member 26 and is arranged to push away obstacles placed in front of the train 10, and the retracted position, wherein the shield element 20 is in contact with such distal end 26b of the supporting member 26.

[0032] Figure 8 is a further perspective view of the obstacle deflector 12 of figure 7 with its sub-assembly 17 in the extended position, while figure 9 is a perspective view of the obstacle deflector 12 of figure 7 with its sub-assembly 17 in the retracted position.

[0033] Advantageously, in one embodiment and/or the other, the obstacle deflector 12 comprises also an anti-climber known per se, in order to avoid to slide vertically when compressed to the retracted position and to remain in a horizontal position.

[0034] In all embodiments, when the impact force level exceeds the above cited threshold, the tearing elements

21 break and the sub-assembly 17 moves from the extended position to the retracted position.

[0035] The tearing elements 21 such as the above cited bolts or screws are common elements which shall break in a controlled manner. In particular, the tearing elements 21 have to break at the predefined impact force level threshold.

[0036] Preferably, the threshold of the impact force is higher than the level of forces occurring during one impact against a big obstacle, and therefore higher than the requirements provided by the fourth scenario of the EN15227 standard.

[0037] The obstacle deflector 12 can remain in its retracted position without losing its functionality while, in an alternative embodiment, it is locked in the retracted position so as not to slide, but after a crash this should not be a real problem anymore.

[0038] Clearly, the principle of the invention remaining the same, the embodiments and the details of production can be varied considerably from what has been described and illustrated purely by way of non-limiting example, without departing from the scope of protection of the present invention as defined by the attached claims.

Claims

1. Obstacle deflector (12) for a rail vehicle (10) having a carbodyshell (14) with a front end, the obstacle deflector (12) comprising:

- a support member (18, 26) arranged to be fixed at a proximate end (18a) to the a front end of the carbodyshell (14);
- a moving element (16, 24) supported by said support member (18, 26) so as to be slideably movable with respect to the support member (18, 26);
- a shield element (20) fixed to a front end (16a, 24a) the moving element (16, 24); wherein the moving element (16, 24) is arranged to move between:
 - an extended position, wherein the shield element (20) is spaced from a distal end (18b, 26b) of the support member (18, 26) and is arranged to push away an obstacle placed in front of the rail vehicle (10); and
 - a retracted position, wherein the shield element (20) is in contact with the distal end (18b, 26b) of the support member (18) and is arranged not to push away said obstacle.

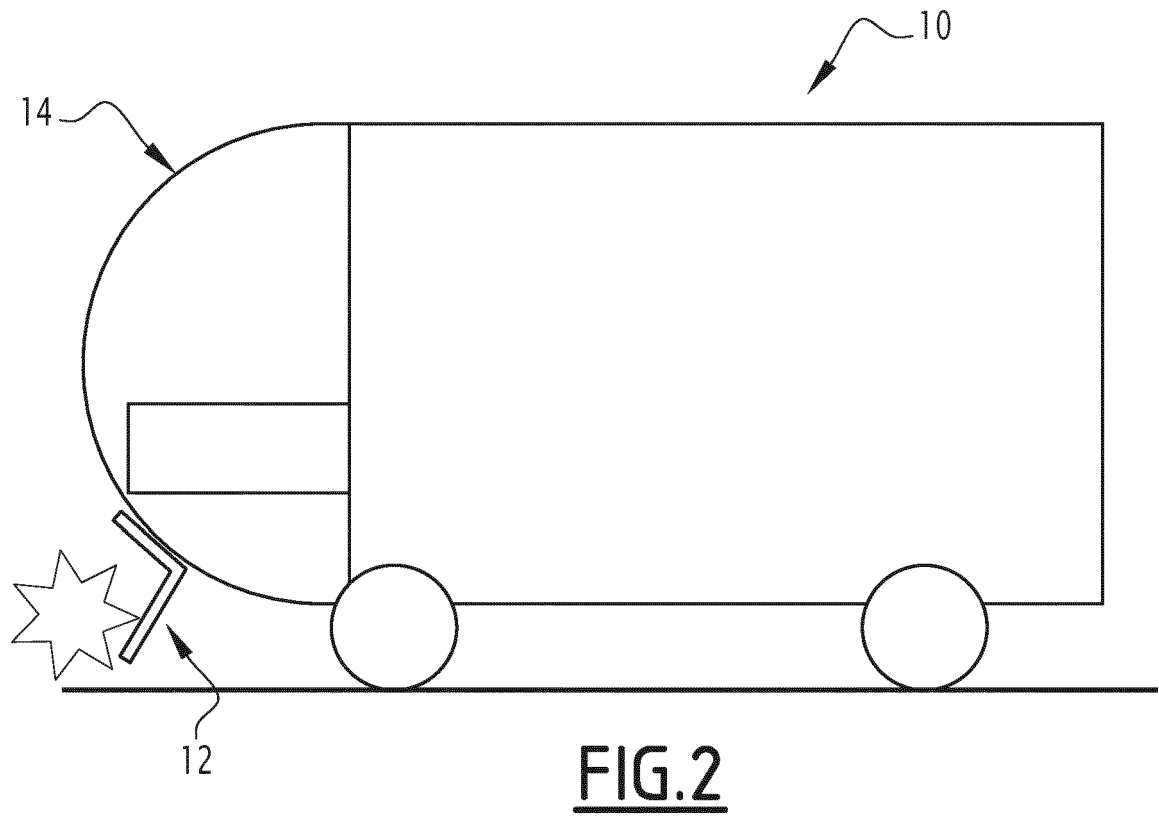
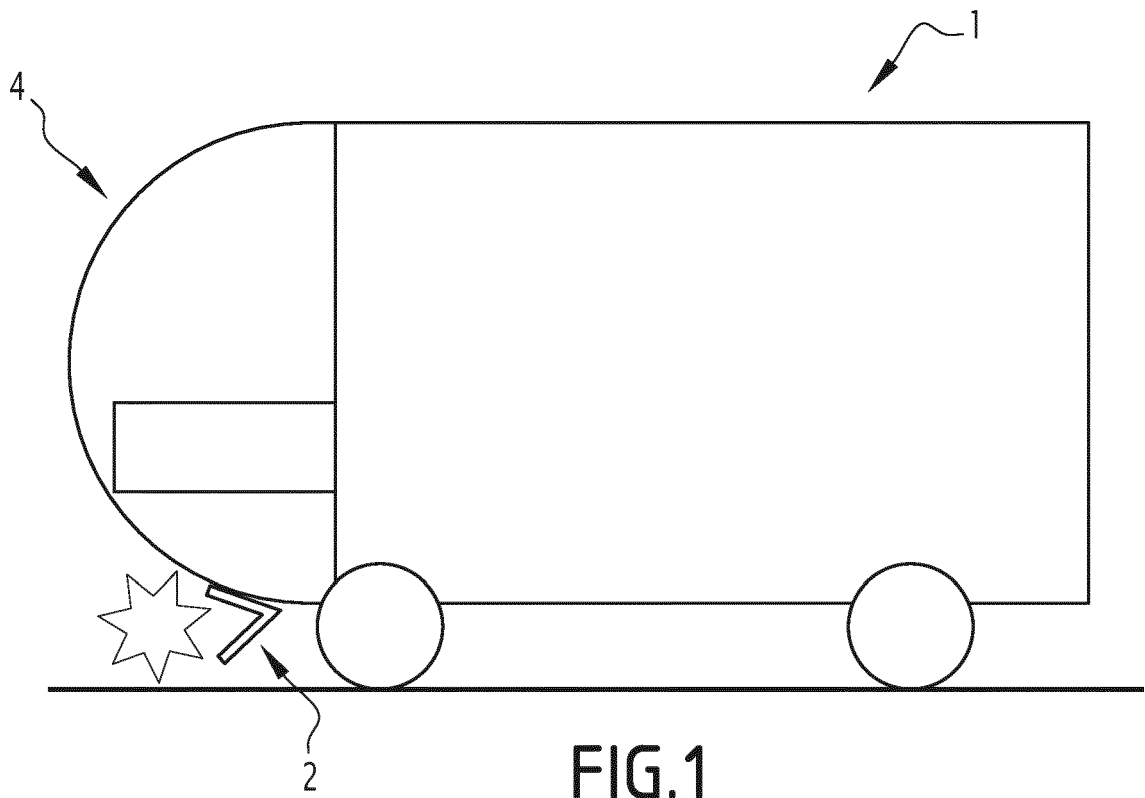
2. The obstacle deflector (12) of claim 1, wherein:

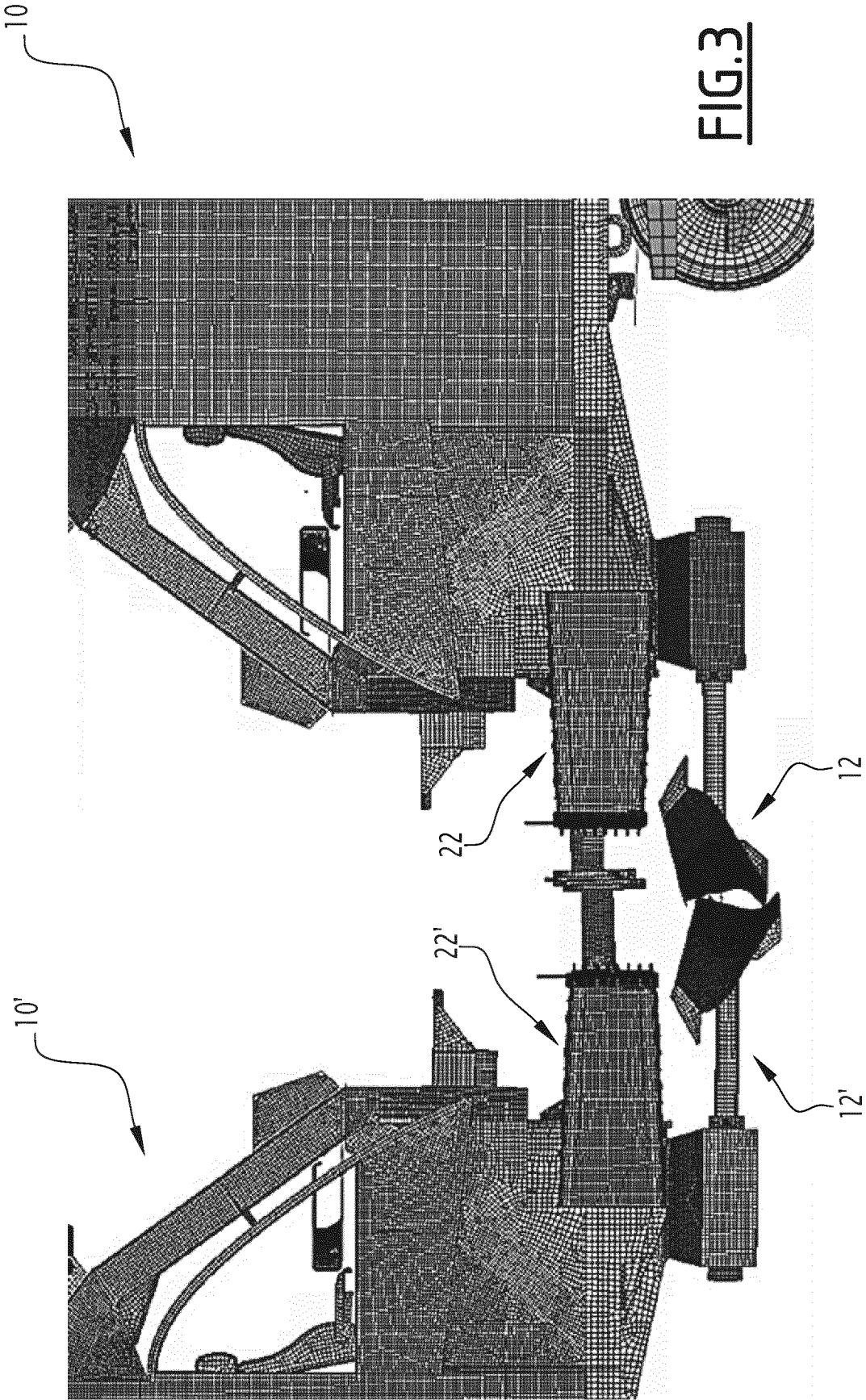
in the extended position, the shield element (20) is arranged to project forward beyond a distal end (22b) of energy absorber elements (22) fixed to the front end of the carbodyshell (14);

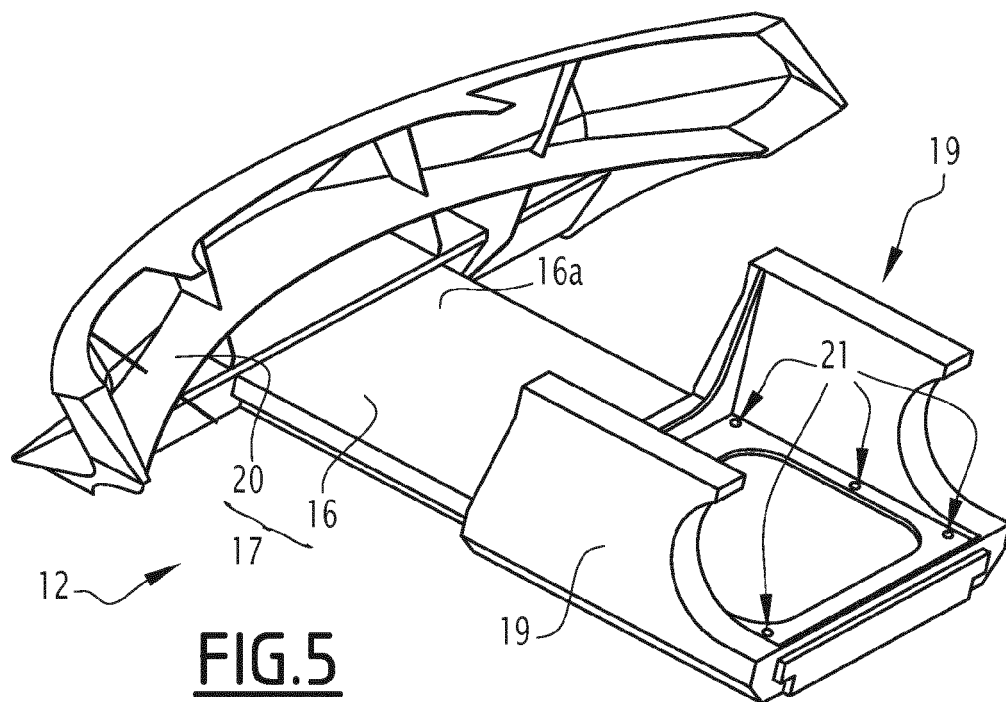
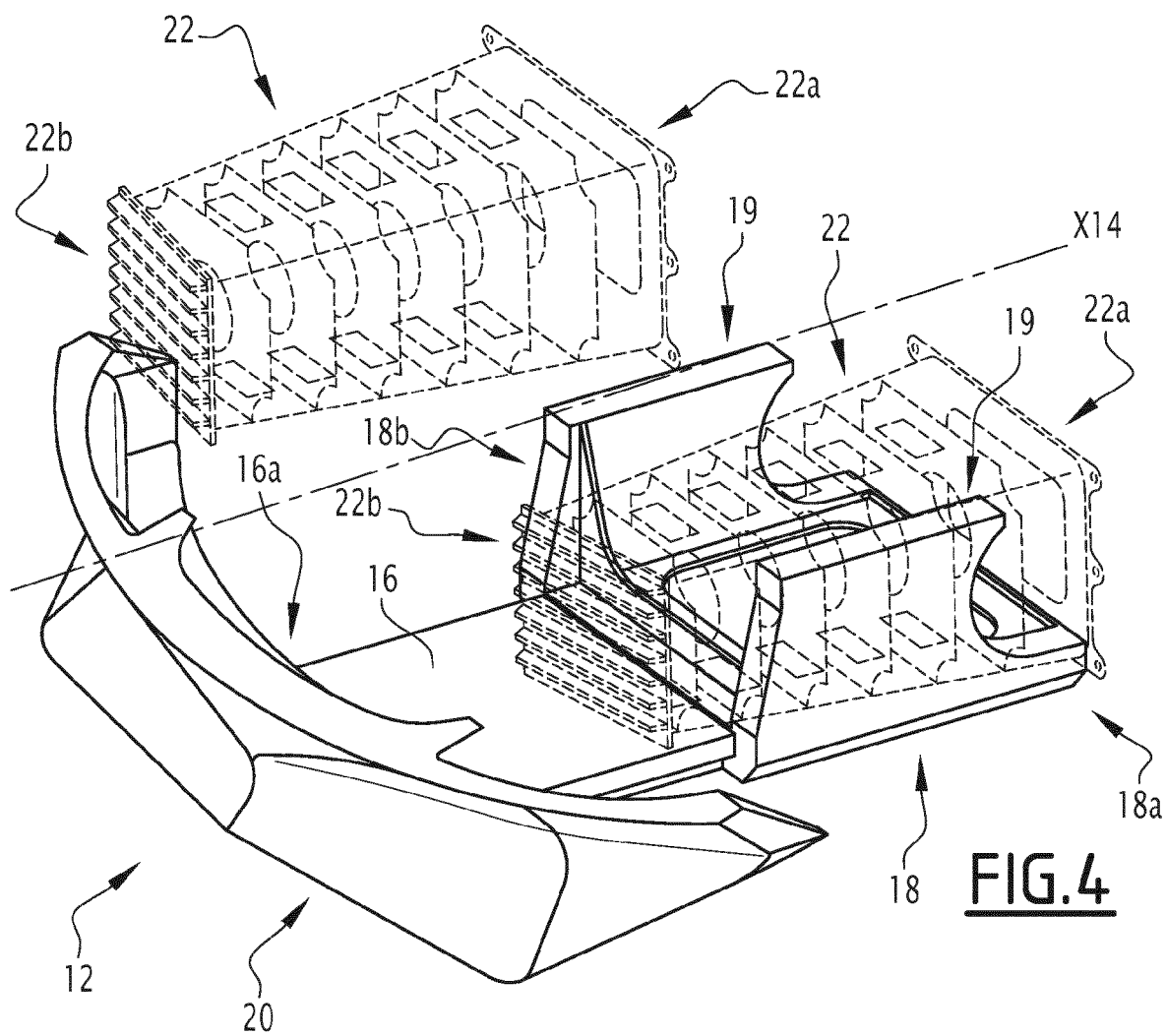
and

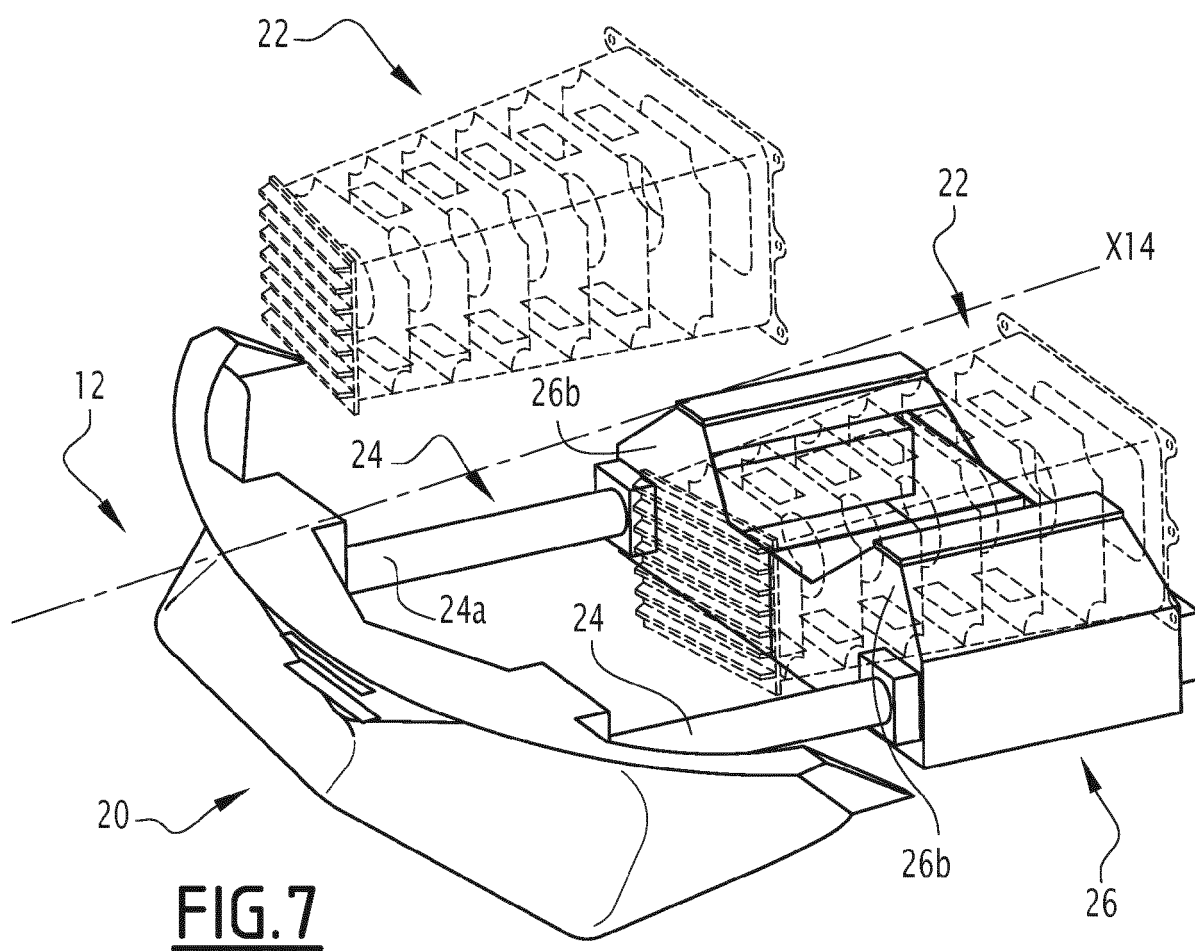
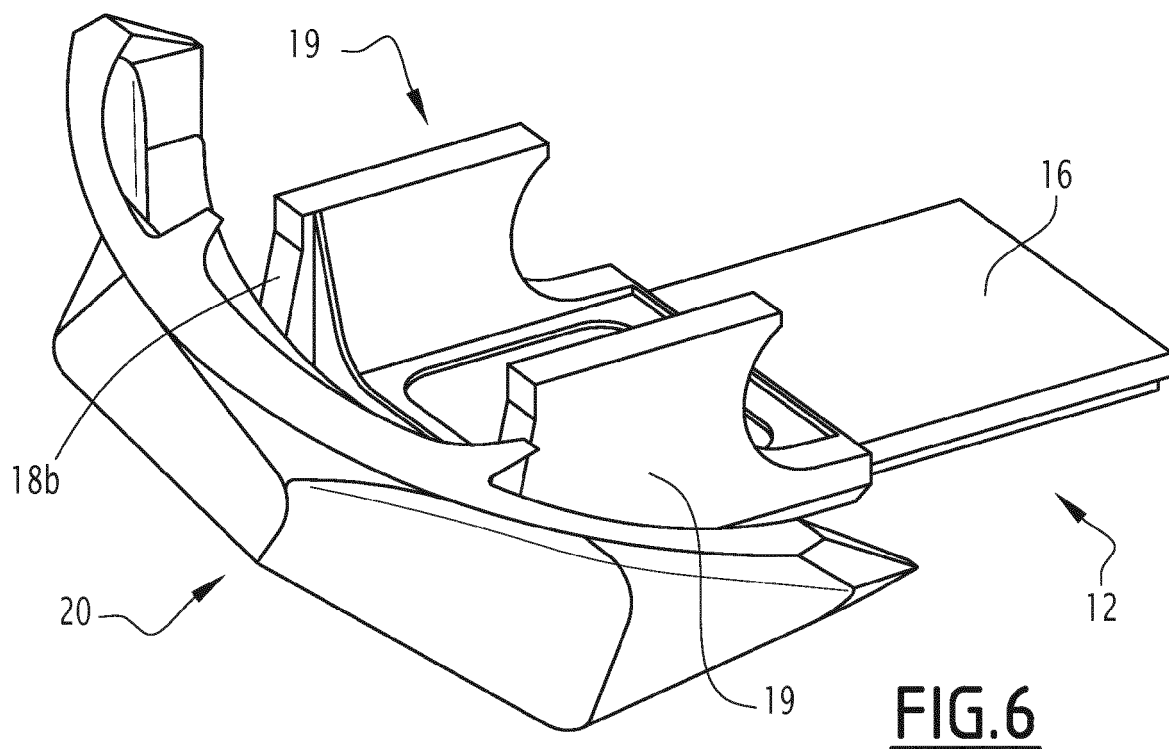
in the retracted position, the shield element (20) is arranged not to project beyond the distal end (22b) of the energy absorber elements (22).

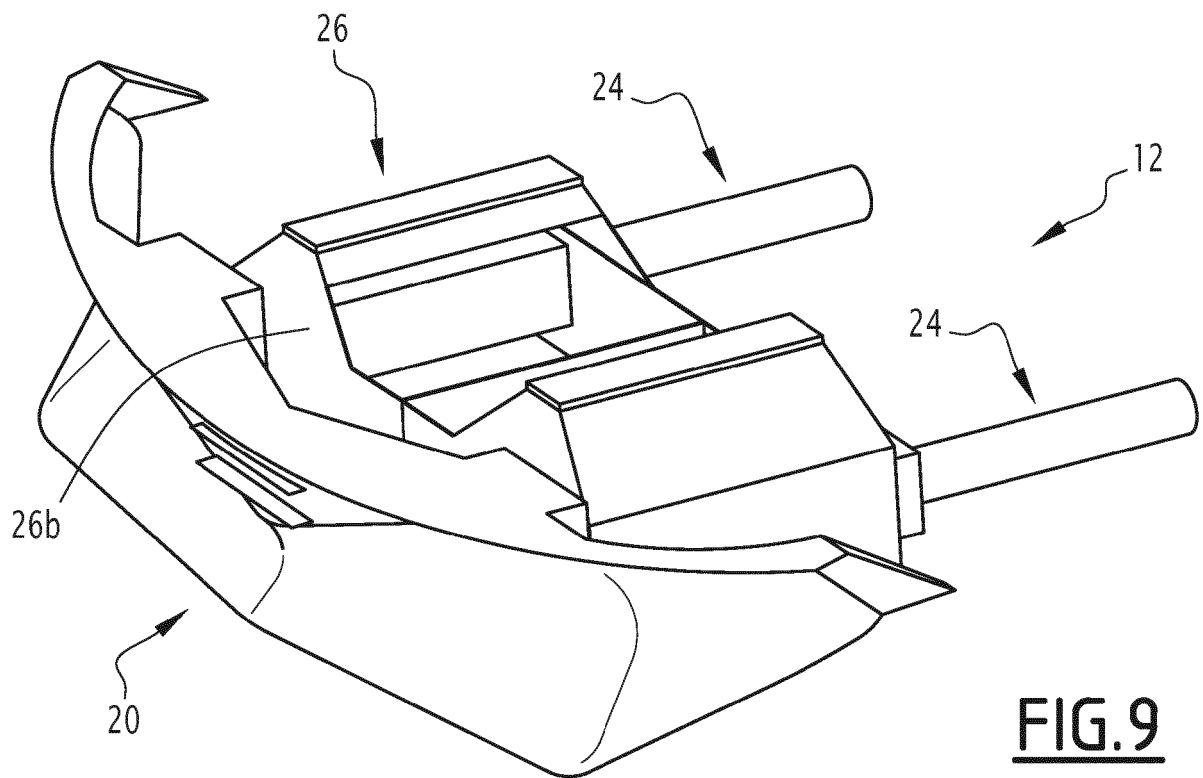
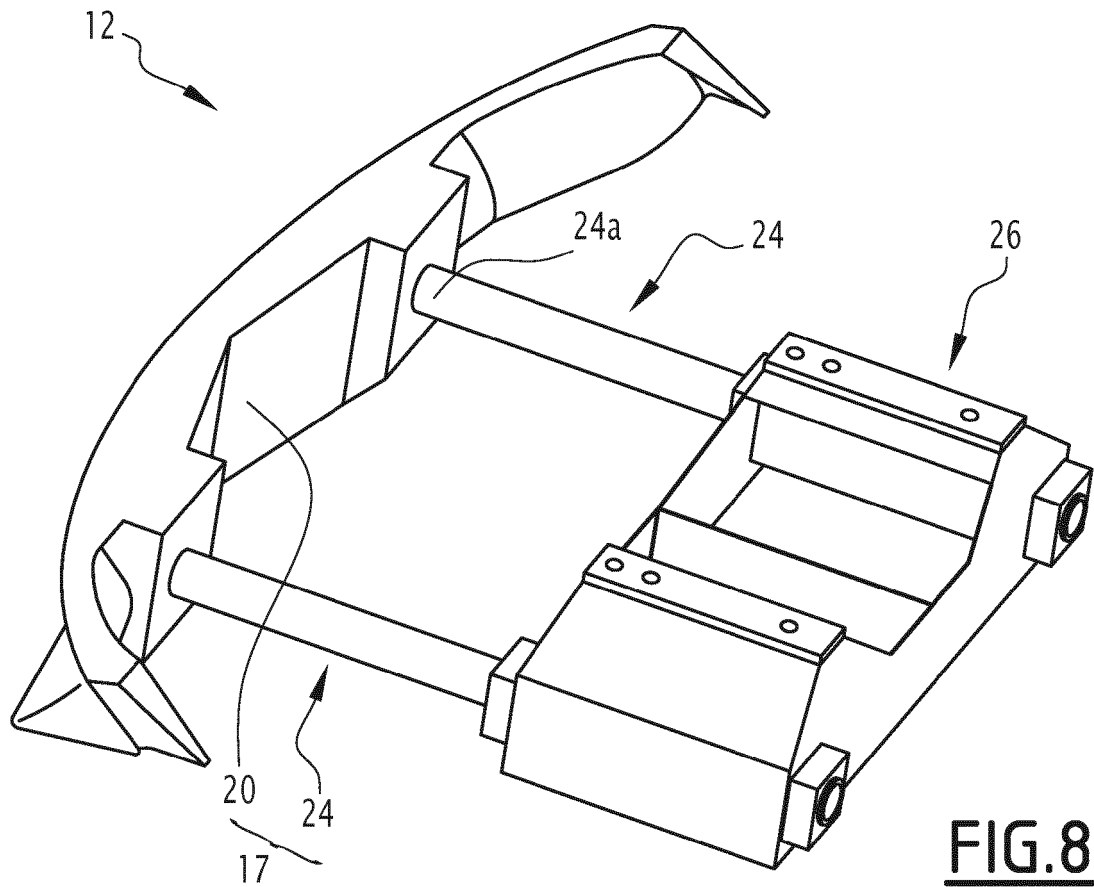
3. The obstacle deflector (12) of claim 1 or 2, wherein the moving element (16, 24) is arranged to move from the extended position to the retracted position when the force of an impact between an obstacle and the shield element (20) exceeds a predetermined threshold.
4. The obstacle deflector (12) of claim 2, wherein one of said energy absorber elements (22) is placed on the moving element (16, 24) between two portions (19) of the support member (18).
5. The obstacle deflector (12) of any of the preceding claims, wherein the moving element is a sledge (16).
6. The obstacle deflector (12) of any of the preceding claims, wherein the moving element is formed by two lateral rods (24).
7. The obstacle deflector (12) of claim 6, wherein the support member (26) is a supporting box (26) arranged to host said lateral rods (24).
8. The obstacle deflector (12) of any of the preceding claims, wherein the moving element (16, 24) and the shield element (20) together form a sub-assembly (17) movable with respect to the support member (18, 26).













EUROPEAN SEARCH REPORT

Application Number
EP 18 30 5679

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	* figures 2,3,12 *	1	
Y	----- US 3 848 914 A (WATHEN R) 19 November 1974 (1974-11-19) * figure 1 *	1	
A	----- DE 121 726 C (W. LANGE) 17 January 1900 (1900-01-17) * figures 1,2 *	1	
A	----- DE 166 218 C (QUOLILIN LUDWIG [HU]; MARKUS LUDWIG [HU]) 11 December 1905 (1905-12-11) * figure 1 *	1	
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			TECHNICAL FIELDS SEARCHED (IPC)
			B61F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 November 2018	Examiner Lorandi, Lorenzo
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